Answer on Question#38382 - Chemistry - Inorganic Chemistry

Question:

Sample of dry gas 25c has the following composition 0.8904g of N2 0.2741g of O2 0.0152g of Ar 0.00107g of CO2 R=0.0821 What are the partial pressure for each component in the mixture?? what is the total pressure??

Answer:

Calculate the number of moles of each gas in mixture:

$n(N_2) = m(N_2)/M(N_2) = 0.8904/(14.007 \cdot 2) = 0.0317841$ mol

$n(O_2) = m(O_2)/M(O_2) = 0.2741/(15.999 \cdot 2) = 0.0085662$ mol

$n(Ar) = m(Ar)/M(Ar) = 0.0152/39.948 = 0.0003805$ mol

$n(CO_2) = m(CO_2)/M(CO_2) = 0.00107/(12 + 15.999 \cdot 2) = 0.0000243$ mol

The total pressure of mixture cannot be found from the provided data. We can assume that the pressure of mixture is atmospheric. Hence we can calculate the partial pressure of each component in mixture.

$n(total) = 0.31784 + 0.008566 + 0.0003805 + 0.0000243 = 0.040755$ mol

$x(N_2) = n(N_2)/n(total) = 0.7799$

$x(O_2) = n(O_2)/n(total) = 0.2102$

$x(Ar) = n(Ar)/n(total) = 0.00934$

$x(CO_2) = n(CO_2)/n(total) = 0.000596$

$p_i = x_i \cdot p(total)$

$p(N_2) = n(N_2)/n(total) = 0.7799 \cdot 101325$ Pa $= 79020$ Pa

$p(O_2) = n(O_2)/n(total) = 0.2102 \cdot 101325$ Pa $= 21300$ Pa

$p(Ar) = n(Ar)/n(total) = 0.00934 \cdot 101325$ Pa $= 946$ Pa

$p(CO_2) = n(CO_2)/n(total) = 0.000596 \cdot 101325$ Pa $= 60.4$ Pa